

SONY®

TELECINECORDER

BM-2100

REMOTE CONTROL UNIT

RM-210

BEAM SPLITTER

VCR-210

MOUNTING PLATE

MVS-210

OPERATING INSTRUCTIONS

OPERATING INSTRUCTIONS

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- Before operating the unit, please read this manual thoroughly.
- This manual should be retained for future reference.

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MODE D'EMPLOI

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- Avant de faire fonctionner l'appareil, lire attentivement ce mode d'emploi.
- Le conserver pour toute référence ultérieure.

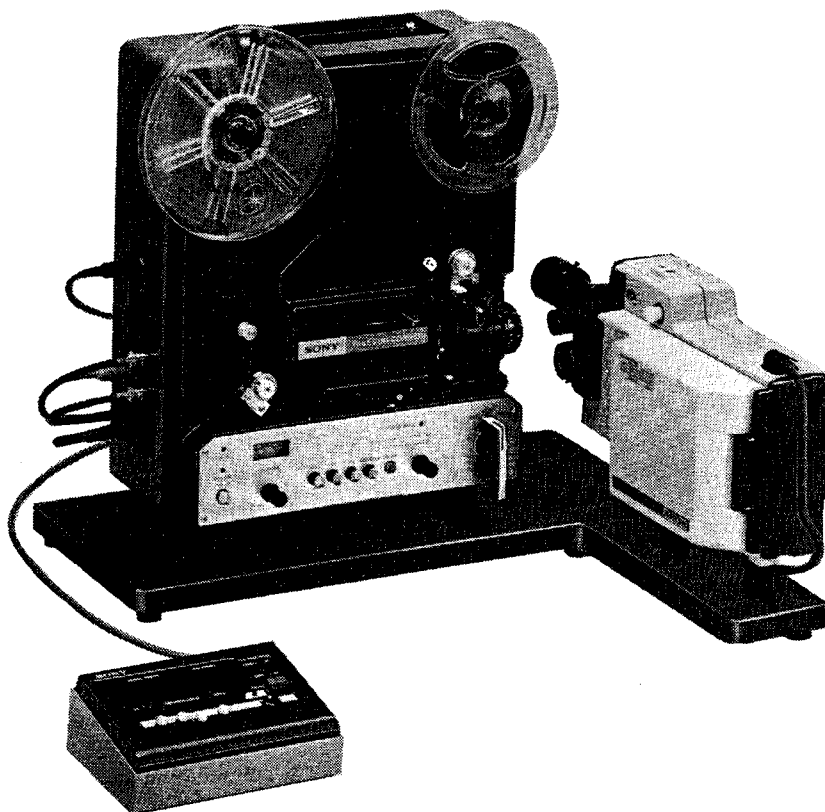
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BEDIENUNGSANLEITUNG

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- Vor Inbetriebnahme lesen Sie bitte diese Bedienungsanleitung sorgfältig durch.
- Bewahren Sie diese Anleitung zum späteren Nachschlagen gut auf.

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TELECINECORDER

BM-2100

The BM-2100 comes in four types: the European model, the UK model, the U.S.A. and Canadian model, and the model for other countries. These four types are identical in operating procedures and characteristics except for the difference in operating voltage. See "OPERATING VOLTAGE".

OWNER'S RECORD

The model and serial numbers are located at the right side. Record these numbers in the spaces provided below. Refer to them whenever you call upon your Sony dealer regarding this product.

Model No. **BM-2100** Serial No. _____

WARNING

- To prevent fire or shock hazard, do not expose the unit to rain or moisture.
- To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

DANGER !

The projection lamp installed in the unit may be broken if it receives a shock. Always handle the unit with care, observing the precautions described on page 11.

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FEATURES

- Flicker-free, stable picture for any TV systems; 60-field or 50-field system, NTSC, PAL or SECAM.
- Variable speed control from still picture projection to 40 frames/sec. (super 8 and single 8) or 48 frames/sec. (regular 8).
- Separate motors for the pull-down mechanism and the film transport mechanism.
- Projection of any film format, super 8 and single 8, or regular 8.
- Synchronous pulse sound projection by using a tape recorder.
- Automatic film stop at the frame where projection is to be started by means of sensing foil.
- Pause function to stop momentarily the film transport. There will be no drag in the sound when the film resumes, just as there is no drag in the sound of a tape recorder when the pause mode is released.
- Manual film threading with no film jams.
- Wide shutter opening of 140°.
- Two flywheeled shafts and two pinch rollers to keep smooth film drive for better magnetic sound reproduction.
- Unbalanced sound output.
- Automatic film loop forming for keeping the exact sound/picture separation of 18 frames.
- A low-cost 50-W halogen lamp.
- With use of the RM-210 Remote Control Unit, the following operations can be controlled from a remote location: single frame advance, pause (stop frame), still, stable projection speed of 18 or 24 frames/sec. locked to power line frequency or TV field, variable speed control up to maximum speed of 48 frames/sec. for super 8 or single 8, and regular 8.

PRECAUTIONS

- Check that the operating voltage of your unit is identical with the voltage of your local power supply.
- Unplug the unit from the wall outlet when it is not to be used for an extended period of time. To disconnect the cord, pull it out by grasping the plug. Never pull it by the cord.
- Do not install the unit in a location near heat sources such as radiators or air ducts, or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.
- Allow adequate air circulation to prevent internal heat build-up.
- Should any liquid or solid object fall into the unit, unplug the unit and have the unit checked by qualified personnel before operating it any further.

- If you have any question or problem concerning your unit that is not covered in this manual, please consult your nearest Sony dealer.

OPERATING VOLTAGE

European model

The unit is for operation on 220 V ac, 50 Hz. Use only the supplied ac power cord; do not use any other type.

UK model

The unit is for operation on 240 V ac, 50 Hz. Use only the supplied ac power cord; do not use any other type.

U.S.A. and Canadian model

The unit is for operation on 120 V ac, 60 Hz. Use only the supplied ac power cord; do not use any other type.

Model for other countries

The unit is for operation on 120 or 220 V ac, 50/60 Hz. Use only the supplied ac power cord; do not use any other type.

NOTICE FOR THE CUSTOMERS IN THE UNITED KINGDOM

WARNING

This apparatus must be earthed to your 3-pin plug in accordance with following instructions.

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

Green-and-yellow: Earth (safety earth)

Blue: Neutral

Brown: Live

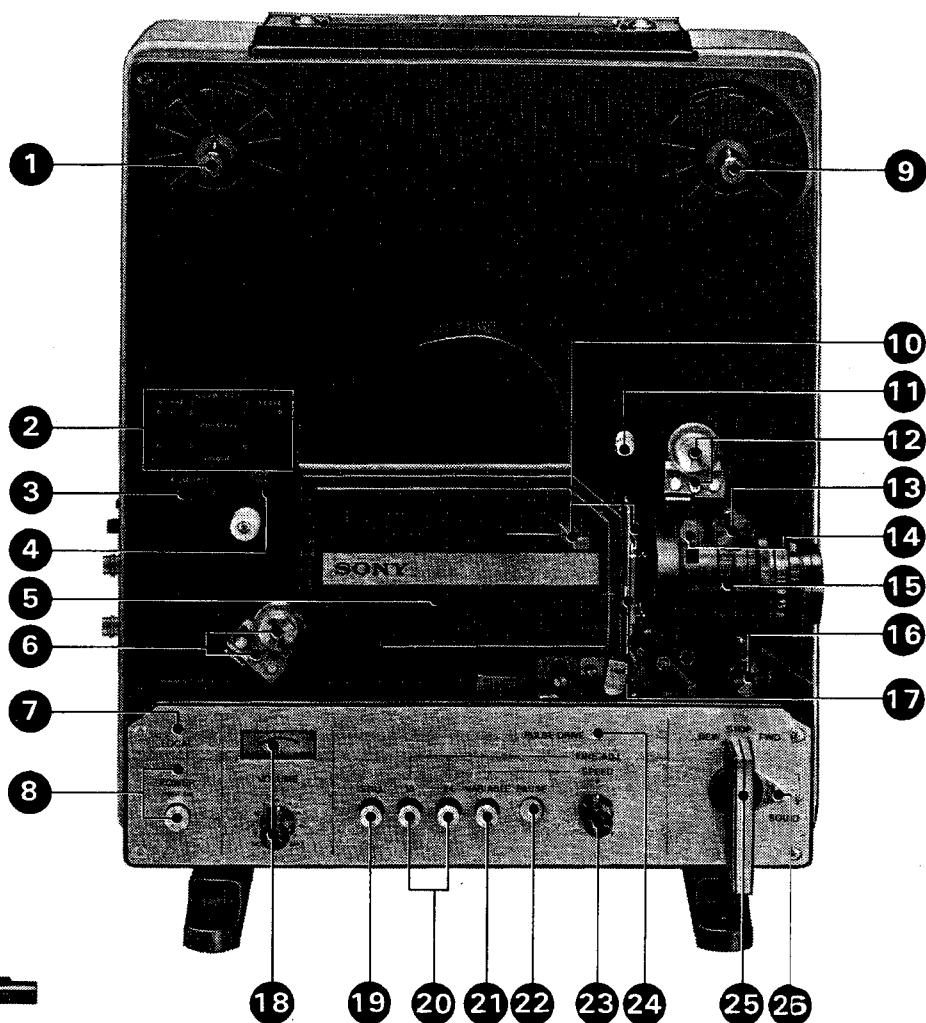
As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows: The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol \perp or coloured green or green-and-yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.

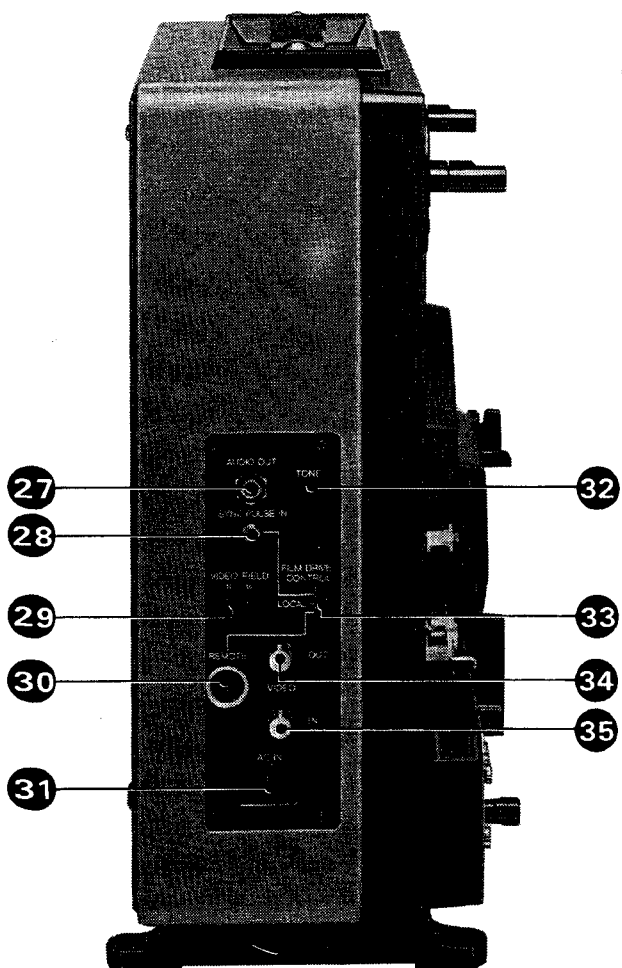
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

LOCATION AND FUNCTION OF CONTROLS

Left side



Rear



① Take-up Reel Spindle with Reel Lock

② Claw Adjustment Controls [CLAW ADJ]: These controls adjust the pull-down movement of the claw for stable picture.

DURATION Controls: These controls adjust the duration during which the claw protrudes to pull down a film frame.

POWER Controls: These controls adjust the amount of protrusion of the claw.

③ FILM TYPE Selector

R: for regular-8 films

S: for super-8 and single-8 films

④ Loop Sensor Control [LOOP SEN]: Adjusts the luminosity of the LED for detecting a film loop by the phototransistor.

⑤ Lamp Housing Cover

⑥ Take-up Sprocket and Film Locking Shoe

⑦ LOCAL Control Indicator: Lights up when the FILM DRIVE CONTROL selector is set to LOCAL.

⑧ POWER Switch and Pilot Lamp: Depress to turn on the unit. The Pilot Lamp will light up. To turn off, depress again.

⑨ Supply Reel Spindle with Reel Lock

⑩ Film Gate Pressure Holder and Film Gate Locking Lever: Pass the film between the film gate and the holder, and set the lever to the extreme left to lock the film in place.

⑪ Tension Roller

⑫ Feed Sprocket and Film Locking Shoe

⑬ Framing Control: Turn to adjust the framing in the vertical direction.

⑭ Focus Lock Knob: Turn 180° counterclockwise for adjusting focus. Turn 180° clockwise to lock after the image is precisely focused on the monitor.

⑮ Lens Mount (C-mount), Framing Adjustment Ring, and Projector Lens: Remove the Framing Adjustment Ring when the unit is to be used with a video camera equipped with a 1 inch pickup tube. When the unit is to be used with a video camera equipped with a $\frac{2}{3}$ inch pickup tube, the Framing Adjustment Ring is necessary.

⑯ Focus Control: Unlock the Focus Lock Knob ⑭ by turning it 180° counterclockwise, and turn the control to adjust focus.

⑰ Film Gate Format Change Lever: Set to S (upper position) for super-8 and single-8 films, and to R (lower position) for regular-8 films.

⑱ VOLUME Control and Level Meter: Turn clockwise to increase the playback sound volume. The meter shows the playback level of the sound.

⑲ STILL Button: Depress for still picture projection. To release the button, depress the 18 or 24 button (see ⑳ below).

⑳ Projection Speed Selector Buttons [18] [24]: Depress the 18 button for projection at a speed of 18 frames/sec., and the 24 button for projection at a speed of 24 frames/sec.

㉑ VARIABLE Speed Control Selector Button: Depress for variable control of projection speed (see ㉓ below).

㉒ PAUSE Button: Keep depressed to stop the film momentarily. A still picture will be obtained on the monitor while the button is being depressed. When the button is released, the film will run again.

㉓ Fine Adjustment/Speed Control [FINE ADJ/SPEED]: Normally set the control to "0" (center position). When the 18 or 24 button is depressed, fine adjustment of the speed is possible. When the VARIABLE speed control selector button is depressed, the projection speed can be controlled variably from slow-motion to fast-speed projection.

㉔ PULSE DRIVE Indicator: Lights up when the FILM DRIVE CONTROL selector is set to SYNC PULSE IN. It flickers when pulse signals of a proper level are supplied from a tape recorder.

㉕ Function Lever

FWD: for projecting a film.

STOP: for stopping the film. Be sure to set the lever to STOP when the unit is not in use.

REW: for rewinding the film.

㉖ Sound Pad Stopper Release Lever: Push down when a film with magnetic sound track(s) is projected.

㉗ Audio Output Jack [AUDIO OUT] (phone jack): For balanced output, use a connecting cord with a stereo binaural plug.

㉘ Sync Pulse Input Jack [SYNC PULSE IN] (minijack)

㉙ VIDEO FIELD Selector: Selects the TV scanning system.

50: for a 50-field system

60: for a 60-field system

㉚ REMOTE Control Connector (8-pin DIN connector)

㉛ AC Input Socket [AC IN]

㉜ TONE Control: Turn clockwise for more treble or counterclockwise for less treble with a small screwdriver.

㉝ FILM DRIVE CONTROL Selector

SYNC PULSE IN: for controlling the film drive by the pulse signals supplied from a tape recorder.

LOCAL: for controlling the film drive with this unit.

REMOTE: for controlling the film drive with the RM-210 Remote Control Unit.

㉞ Video Output Connector [VIDEO OUT] (BNC connector)

㉟ Video Input Connector [VIDEO IN] (BNC connector): Connect the video signal (or vertical drive pulse) from the camera.

INSTALLATION AND CONNECTIONS

INSTALLATION

Use the MVS-210 Mounting Plate for optimum installation and positioning of the unit, video camera and slide projector. Use of the Sony DXC-1600 series Color Video Camera (optional) is recommended.*

① Mount the camera onto the mounting plate upside down. For details, refer to the instructions of the MVS-210 (page 19).

② Remove the zoom lens from the camera, and mount the VCR-210 Beam Splitter into the lens mount. Attach a 100 - 105 mm enlarging lens to the Focusing Barrel of the VCR-210. If a slide projector is not to be used, remove the long barrel with the Focusing Barrel by turning the knurled ring, and put the dust cap in place. For details, refer to the instructions of the VCR-210 (page 18).

③ Set the BM-2100 Telecinecorder on the mounting plate at right angles to the camera so that the projection lens of the BM-2100 is directed straight towards the short barrel of the VCR-210 and the optical axis of the barrel coincides with that of the projection lens. If necessary, loosen the Angle Adjustment Screw of the VCR-210 and turn the Mirror Box for precise positioning.

Note: The Framing Adjustment Ring (for cameras equipped with a $\frac{2}{3}$ inch pickup tube) is mounted at the factory. When the unit is to be used with a camera equipped with a 1 inch pickup tube, remove the ring.

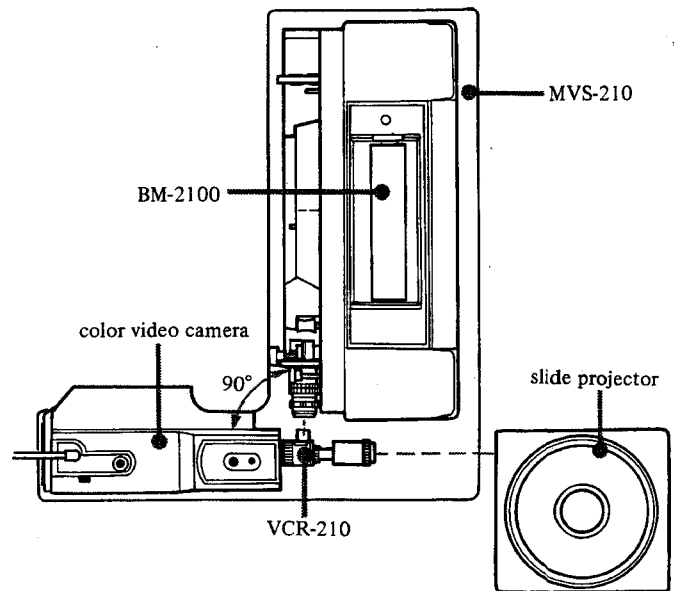
④ Open the casing of a slide projector, and remove the condenser lens. Attach the opal glass diffuser supplied with the VCR-210 instead. (If the diffuser does not fit, trim it to the appropriate size.) Remove the projection lens of the slide projector.

⑤ Place the slide projector so that it faces the camera and the optical axis of the opal glass diffuser coincides with that of the camera.

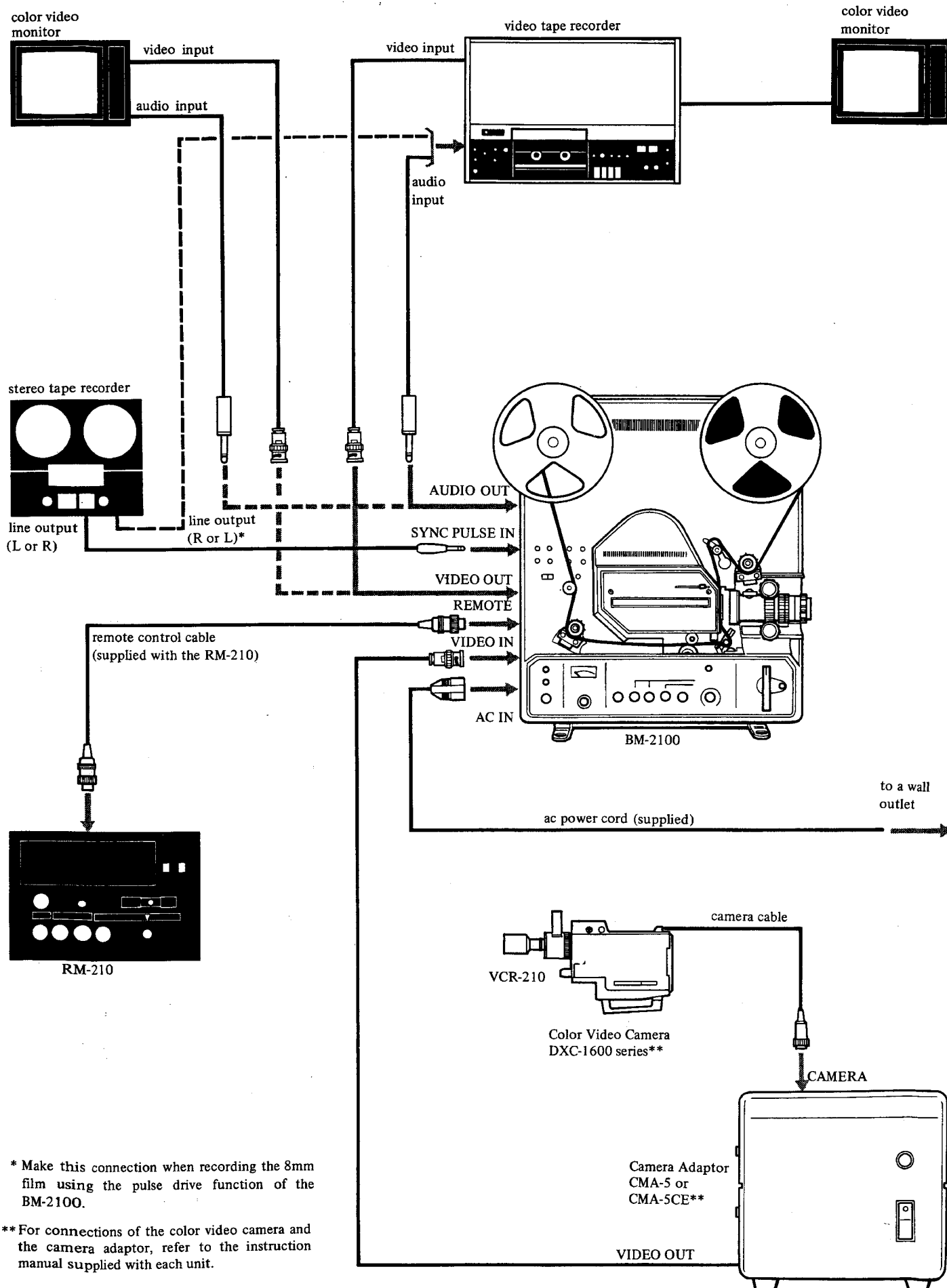
* If other type of video camera is used and the light source of the unit is insufficient for the camera, replace the opal glass diffuser between the projection lamp and the film gate in the lamp housing with the frosted glass diffuser (supplied).

For removal of the lamp housing cover and the opal glass diffuser, refer to "Adjustment of the projection lamp and parabolic mirror" and "Cleaning the diffuser".

Caution: When the frosted glass diffuser (supplied) is used, be careful not to leave the unit for more than about 30 seconds with the STILL button depressed. If this is done, the film may be damaged by the heat of the projection lamp.



CONNECTIONS



* Make this connection when recording the 8mm film using the pulse drive function of the BM-2100.

** For connections of the color video camera and the camera adaptor, refer to the instruction manual supplied with each unit.

FILM THREADING

FILM FORMAT SELECTION

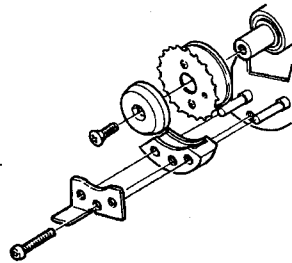
Super 8 and single 8

The unit has sprocket wheels and film locking shoes for super-8 and single-8 films mounted at the factory. Make sure that the Film Gate Format Change Lever and the FILM TYPE selector are set to "S".

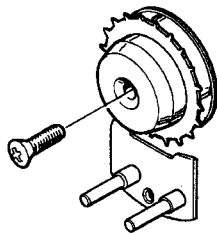
Regular 8

Replace the sprocket wheels and film locking shoes with those for regular-8 films (supplied) as follows. For easier replacement, push down the film locking shoes.

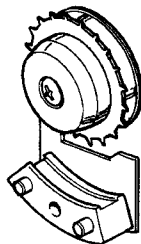
- 1 Remove the sprocket wheels and film locking shoes for super-8 and single-8 films with a Phillips head screwdriver as illustrated.



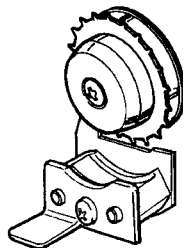
- 2 Attach the supplied sprocket wheels for regular 8 and tighten the screws.



- 3 Fit the film locking shoe for regular 8 (black) into the two pins as illustrated.



- 4 Replace the metal cover on the film locking shoe and tighten the center screw.



- 5 Set the Film Gate Format Change Lever and FILM TYPE selector to "R".

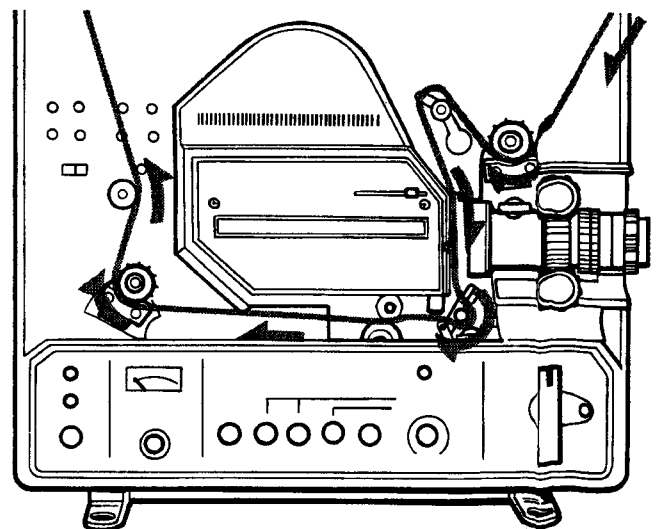
FILM THREADING

Use the same kind of reels (size and hub diameter) for both supply and take-up.

Notes

- Be sure that the reels used fit on the spindles of the unit. If the reel holding regular-8 film does not fit the spindle, transfer the film onto a reel for super or single 8 using an appropriate 8mm projector.
- Do not use reels with too small a hub diameter. Film take-up torque applied to the reels in pause operation will be very large.

- 1 Place the empty reel on the left (take-up) spindle and the full reel on the right (supply) spindle.
- 2 Secure the reels by pulling out and turning the reel locks.
- 3 Draw out approximately 90 cm (35½ inches) of leader strip (and film). Push down the film locking shoe to unlock, pass the leader strip under the feed sprocket, and lock by pushing up the shoe. Make sure that the protruding pins of the sprocket fit into the perforations of the film.
- 4 Set the Film Gate Locking Lever to the right to unlock, and thread the film as illustrated. Adjust the film loop over the Tension Roller at the left of the feed sprocket so that the film is about 5–10 mm away from the Tension Roller, and lock the film at the film gate by returning the Film Gate Locking Lever to the left.
- 5 Pass the film under the take-up sprocket and lock it with the film locking shoe as done at the feed sprocket.
- 6 Wrap the film around the hub of the left reel, or insert the end of the film into the reel slot.
- 7 Rotate the left reel a few times by hand until the slack in the film is taken up.



PREPARATIONS

Turn on the video monitor, camera, and other connected equipment, and complete all the necessary adjustments on them. For details, refer to the instruction manual furnished with each unit. (The white balance of the camera should be adjusted later. See "OPERATION".)

OPERATION

- ① Turn on the POWER switch. The Pilot Lamp will light up.
- ② Select the type of scanning system (video field) with the VIDEO FIELD selector located on the rear of the unit.
50: for a 50-field system
60: for a 60-field system
- ③ Select the type of film drive control with the FILM DRIVE CONTROL selector on the rear.
SYNC PULSE IN (upper position): for controlling the film drive by the sync pulse signals supplied from a tape recorder. See page 12.
LOCAL (center position): for controlling the film drive with this unit.
REMOTE (lower position): for controlling the film drive with the RM-210 Remote Control Unit. Refer to the RM-210 instruction manual.
- ④ Select the projection speed with the Projection Speed Selector Buttons, normally 18 or 24. The FINE ADJ/SPEED control is normally set to "0" (center position).
- ⑤ Set the Function Lever to FWD. The film will start running.
- ⑥ Depress the STILL button at a desired picture, and adjust the white balance on the camera. After completion of the white-balance adjustment, depress the 18 or 24 button again.

- ⑦ Adjust the framing and focusing while observing the monitor screen.

Vertical framing is adjusted with the Framing Control. Horizontal framing and the size of picture on the monitor screen can be adjusted by moving the unit sideways, forward, or backwards with respect to the camera (the short barrel of the VCR-210 attached to the camera), for proper centering.

If the picture is tilted, loosen the Angle Adjustment Screw of the VCR-210 and turn the Mirror Box for precise positioning.

Unlock the Focus Lock Knob by turning it 180° counterclockwise, adjust the Focus Control for a sharp image on the monitor, and lock the Focus Lock Knob.

Note: If the type of film is changed from super or single 8 to regular 8, or vice versa, be sure to readjust the framing and focusing.

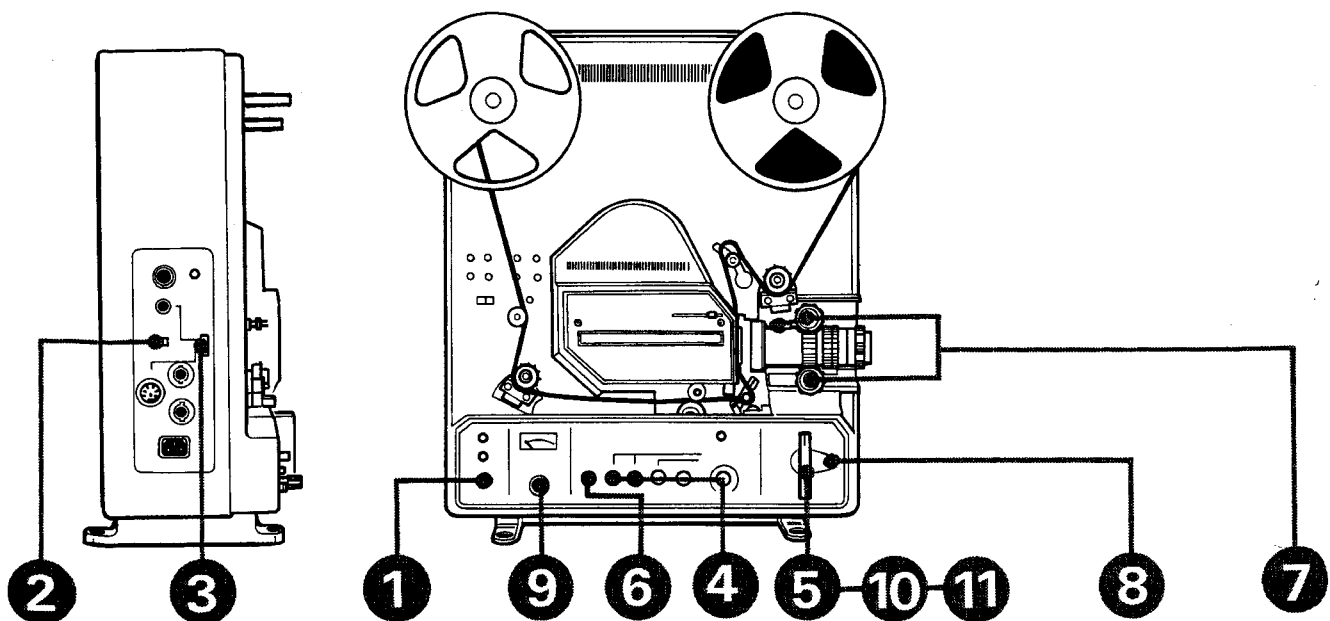
- ⑧ When projecting a magnetic sound film, push down the Sound Pad Stopper Release Lever. The sound will be heard clearly from the monitor speaker.

- ⑨ Adjust the playback volume with the VOLUME control.

- ⑩ When projection of the film is finished, set the Function Lever to STOP. The Sound Pad Stopper Release Lever will automatically return to the original position.

- ⑪ To rewind the film, remove it from the normal film path so that it passes directly from the take-up reel to the supply reel. Set the Function Lever to REW. After completion of the rewinding, return the Function Lever to STOP.

Rewinding can also be done with the film threaded. However, such rewinding is not recommended because it may damage the film and its perforations.



Adjustment of projection speed

Normally a super-8 or single-8 film is projected at a speed of 18 or 24 frames/sec. according to the operating speed of camera during filming. Fine adjustment of the speed (-4 to +1 frames/sec. for super or single 8) is possible with the FINE ADJ/SPEED control.

A regular-8 film is projected normally at a speed of 16 frames/sec. according to the operating speed of camera. When the 18 button is depressed, turn the FINE ADJ/SPEED control from "0" to the left by approximately 90°. However, precise speed adjustment in the projection of regular-8 films requires the RM-210 Remote Control Unit. Refer to the RM-210 instruction manual.

When slow-motion or fast-speed projection is desired, depress the VARIABLE speed control selector button and turn the FINE ADJ/SPEED control to the right (fast speed) or left (slow motion).

If the VARIABLE speed control selector button is depressed with the FINE ADJ/SPEED control set to the extreme left, still picture projection will result.

To stop the film momentarily, keep the PAUSE button depressed. The film will stop while the button is being depressed. When the button is released, the film will start running again. When a still picture projection is desired, depress the STILL button. To release the button, depress the 18 or 24 button again.

For precise projection speed adjustment, the use of the RM-210 Remote Control Unit is recommended, which features stable speeds of 18 and 24 frames/sec. locked to the power line frequency or TV field, continuously variable speeds of 6 to 48 frames/sec. (for super or single 8 and regular 8), still picture, frame stop (pause), and single frame advance.

Adjustment of claw and loop sensor

The unit is adjusted at the factory, but if the picture on the monitor screen rolls because of faulty film pull-down by the claw, proceed as follows:

(a) **When the film loop is properly formed over the Tension Roller** (11 on page 5), check the threading of the film, since faulty pull-down by the claw may be caused by a film being improperly threaded at the film gate. If the picture continues to roll even with the film properly threaded, adjust the LOOP SEN control with a small screwdriver.

(b) **When the film is stretched too tight over the Tension Roller**, rethread the film properly, forming a proper film loop over the Tension Roller. Also check that the protruding pins of the sprocket fit into the perforations of the film.

To check that film pull-down by the claw is operating properly after the above adjustments, set the Function Lever to FWD with no film in the machine and push the Tension Roller down to deactivate the safety switch

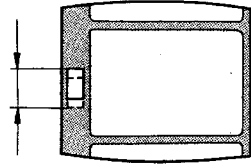
which normally activates when the film is stretched too tight over the Tension Roller. If film pull-down operates properly when this is done, the noise that the pull-down mechanism makes will decrease.

If the picture is unstable, adjust the CLAW ADJ controls and/or the LOOP SEN control with a small screwdriver. The DURATION and POWER controls are provided for 50-field and 60-field TV systems and for super-8 and single-8 films (S) and regular-8 films (R), respectively. Be sure to adjust the proper controls.

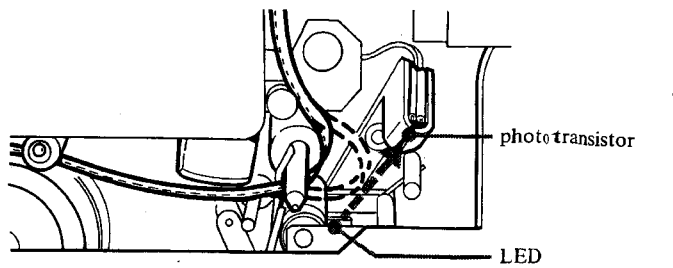
The DURATION controls adjust the duration during which the claw protrudes to pull down a film frame.

The POWER controls adjust the amount of protrusion of the claw.

Adjust these controls as follows:

- ① While the film is running, move the unit towards the camera so that a perforation is displayed on the monitor. Insert a small screwdriver into the
- 
- proper DURATION control, and slowly turn the control screw clockwise or counterclockwise to the point where the perforation appears as high up on the monitor screen as it will go where the picture is most stable.
 - ② Turn the POWER control counterclockwise to a point where the projection noise is least noisy and the picture is most stable.
 - ③ Turn the DURATION control again for a much more stable picture.
 - ④ Depress the VARIABLE speed control selector button and adjust the projection speed at 40 to 48 frames/sec. with the FINE ADJ/SPEED control. Turn the POWER control again for a much more stable picture. Turning the POWER control a little bit farther from the optimum position is recommended to meet a wide range of film conditions (such as in the projection of a spliced film).
 - ⑤ Turn the FINE ADJ/SPEED control to vary the projection speed and verify that the picture is stable at any projection speed. If the picture is not stable, repeat the above steps.

The LOOP SEN control adjusts the luminosity of the Light Emitting Diode (LED) for detecting the film loop, which is detected by the phototransistor.



Insert a small screwdriver into the control, and turn the control screw clockwise or counterclockwise while ob-

serving the film loop. If the control is turned counterclockwise, the luminosity of the LED is decreased, and the light from the LED is not detected by the phototransistor. As a result, the claw does not protrude, and the film loop is not formed. In this case, the picture displayed on the monitor screen slips (rolls). If the control is turned clockwise, the luminosity of the LED is so increased that the light from the LED penetrates the film loop and is detected by the phototransistor. Consequently, the claw keeps on protruding continually to form too much of the film loop. In this case, the film loop over the Tension Roller is reduced, but the film is protected by the safety switch of the Tension Roller.

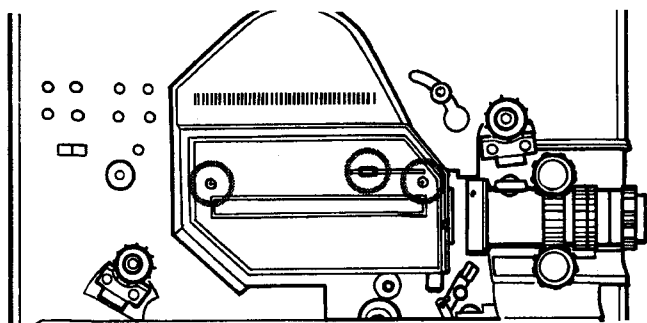
Tone adjustment

Insert a small screwdriver into the TONE control on the rear of the unit, and turn it clockwise for more treble or counterclockwise for less treble. (The position of approximately 25° from the extreme left meets the requirements of the SMPTE test film.)

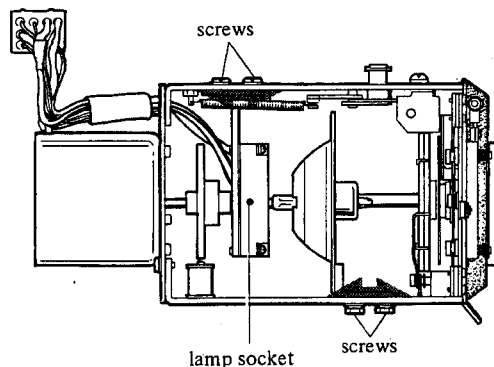
Adjustment of the projection lamp and parabolic mirror

After replacement of the projection lamp, if the projected picture on the monitor screen is not illuminated uniformly, adjust the position of the projection lamp and the parabolic mirror as follows:

- ① Unscrew and remove the lamp housing cover.



- ② Thread a film with a white leader strip, and project the leader strip on the monitor screen with the STILL button depressed.
 - ③ Move the unit slightly to the right as you face the projection lens, to project the perforation of the leader strip, and adjust the focus.
 - ④ Return the unit to the original position so that the perforation goes off of the screen.
 - ⑤ Loosen slightly the four screws at the top and bottom of the lamp housing.
 - ⑥ Adjust the angle of the projection lamp and the mirror using pliers or a similar device so that the screen is illuminated uniformly.
- To adjust the angle of the projection lamp, adjust the lamp socket support bracket, and to adjust the angle of the mirror, adjust the mirror support bracket.



- ⑦ Tighten the four screws to secure the lamp and the mirror.
- ⑧ Replace the lamp housing cover and tighten the screws of the cover.
- ⑨ If the screen is not illuminated uniformly after the above adjustments have been made, replace the projection lamp.

CAUTION

- Always make sure that the lamp housing cover is in place when the unit is in use.
- Never subject the unit to mechanical vibration or shock while the projection lamp is lit.
- Be sure to turn the unit off when replacing the projection lamp.
- Wait until the lamp has cooled off before replacing it. Using your fingers, draw the old lamp straight out between the blades of the fan. Insert the new lamp the same way. Do not use a tool.
- After the new lamp has been inserted, clean your fingerprints off with a soft cloth slightly moistened with alcohol before turning on the unit.

Operation with a slide projector

For installation of the slide projector, refer to "INSTALLATION" on page 6.

Turn on the slide projector, and display a slide on the monitor. Adjust focus by loosening the Focus Adjustment Screw of the VCR-210 and moving the Focusing Barrel.

When the film and the slide are projected simultaneously, the slide and film images are superimposed on the monitor screen. Switching between the film and the slide is possible by turning on and off the BM-2100 or the slide projector.

When the slide projector is not in use, remove the long barrel with the Focusing Barrel by turning the knurled ring, and keep the dust cap in place.

PULSE DRIVE

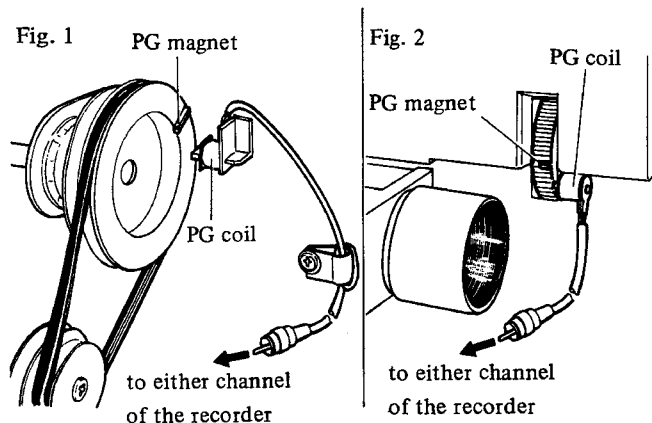
Super-8 or single-8 films with an optical sound track, regular-8 films with magnetic sound track (sound/picture separation of 56 frames) or with an optical sound track, or silent films used in a synchronous sound and picture recording system intended for the amateur market, can be projected exactly in synchronism with sound by using the pulse drive function of this unit.

Pulse signal recording

Open the casing of your 8mm projector, and, with an adhesive agent, glue a PG magnet to the pulley, which is linked to the shaft of the pull-down mechanism and makes one turn per frame. Attach a PG coil by the side of the pulley. Connect the cord from the PG coil to a tape recorder. (Fig. 1) In stereo recording, the pulse signal is recorded on either the right or left channel and the sound of the film on the other channel.

If the casing of your 8mm projector cannot be opened, and if the projector is equipped with a knob which makes one turn per frame, the PG magnet and the PG coil may be attached to such a knob. (Fig. 2)

For the PG magnet and PG coil, please consult your nearest Sony dealer.

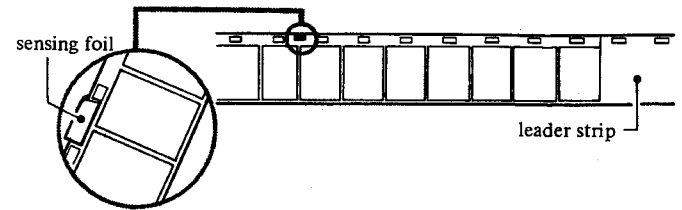


Thread a film in the projector so that the very beginning of the film or the frame where projection is to be started appears in the film gate. Start the recorder in record mode, and start projecting the film. A pulse signal generates each time a new film frame appears in the film gate, and the pulse signal and the film sound are recorded in synchronism. A high-fidelity performance reel-to-reel tape recorder is recommended, but a cassette-corder with a manual recording level adjustment facility may also be used. Adjust the recording level to approximately -10 to -7 on the VU meter of the recorder for pulse signal recording.

Pulse driving

① Attach a piece of the Sony SF-2 Sensing Foil (optional) between the 7th and 8th perforations from the very beginning of the film or from the frame where

projection is to be started.



- ② Set the FILM DRIVE CONTROL selector to SYNC PULSE IN. The PULSE DRIVE indicator will light up.
 - ③ Play back the tape on the tape recorder, and adjust the playback volume control of the recorder so that the PULSE DRIVE indicator flickers consistently. If the volume is increased more, the flickers of the indicator will become irregular, and an even further increase of the volume will cause the indicator to remain constantly lit. Keep the volume at a level at which the flickers are regular. After completion of the adjustment of the playback volume, stop the recorder.
 - ④ Thread the film, and set the Function Lever to FWD with the 18 or 24 button depressed and the FINE ADJ/SPEED control set to "0". (When the FILM DRIVE CONTROL selector is set to SYNC PULSE IN, the STILL button and the VARIABLE speed control selector button are inoperative.) The film starts running, and stops when the frame where projection is to be started (the frame marked with the sensing foil) reaches the film gate.
 - ⑤ Start the recorder in playback mode. The unit will start projecting the film. Slowly turn the FINE ADJ/SPEED control clockwise or counterclockwise while observing the FILM SPEED indicator of the RM-210 Remote Control Unit. When the projection speed falls within the range of ± 0.5 frames/sec. of the speed at which the 8mm projector was operated during pulse signal recording, the FILM SPEED indicator will show a constant speed reading, meaning that the speed falls within the range of synchronization. Then, slowly turn the FINE ADJ/SPEED control to find the upper and lower limits of the constant reading of the indicator, and set the knob at the center of these limits. When projecting a regular-8 film, which is normally filmed and projected at 16 frames/sec., slowly turn the FINE ADJ/SPEED control counterclockwise for a constant reading of the FILM SPEED indicator (near 16 frames/sec.).
- Note:** The projection speed can also be adjusted to fall within the range of synchronization using an oscilloscope as follows: Open the casing of the unit, and connect an oscilloscope to the output from the TP5 on the printed circuit board. While observing the waveform displayed on the oscilloscope, slowly turn the FINE ADJ/SPEED control to the point where the upper and lower horizontal lines of the square wave are equal to each other.
- ⑥ Rewind both the film and the tape, and repeat the above step ④.
 - ⑦ Start the recorder in playback mode. When the point on the tape where the pulse signal and the sound start arrives, the unit will start projecting the film. Thus the film and the sound will start exactly in synchronism.

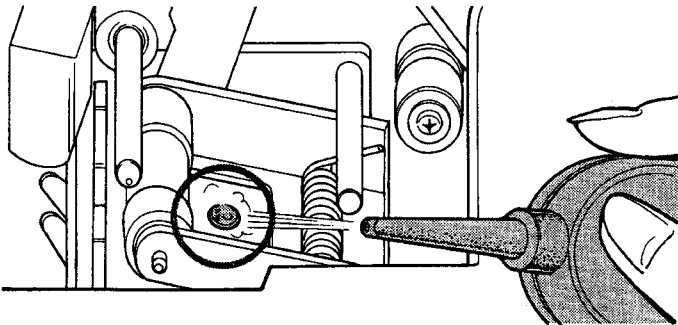
MAINTENANCE

The following maintenance is essential for the proper operation of the unit.

Cleaning the film gate and film path

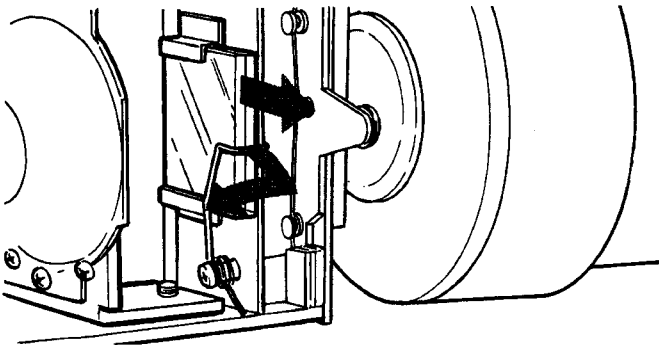
Blow off dust at the film gate with a dust blower or a fine soft brush. If dust persists, clean the film gate with a small hard brush (such as a makeup brush for eyebrows). Also clean every film path and the tension pole with a small hard brush.

Dust and dirt on the light emitting surface of the LED of the loop sensor will decrease the luminosity of the LED and cause abnormal pull-down claw movement. Blow off any dust with a dust blower.



Cleaning the diffuser

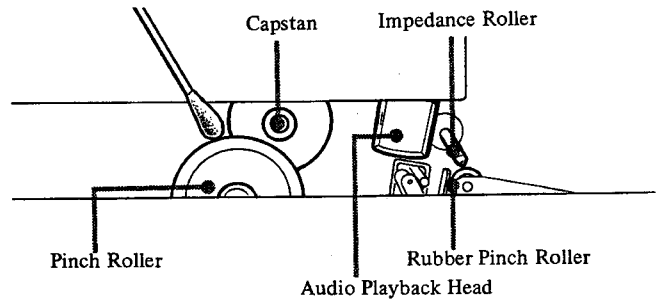
For cleaning of the diffuser, remove the lamp housing cover as described in "Adjustment of the projection lamp and parabolic mirror". Remove the diffuser by releasing the support spring, and clean it with a soft cloth.



Cleaning the head

Keeping the audio playback head clean is essential for proper operation of the unit. Accumulations of dust and sound track oxides on the head will result in sound drop-outs, a loss of high frequencies and excessive sound track wear. Accumulations of dust on the capstan and the pinch rollers will result in scratches on the film.

Moisten a cotton swab or a soft cloth with a denatured alcohol, and gently wipe the head, capstan and pinch rollers over which the film and the sound track(s) travel.



Cleaning the cabinet

Clean the cabinet with a soft cloth slightly moistened with water or a mild detergent solution. Do not use solvents such as alcohol, benzene, or thinner as they may mar the finish of the cabinet.

SPECIFICATIONS

General

Type of unit	Claw pull-down Single blade shutter
Film type	8 mm, super or single 8 and regular 8
Television standard	Both 60 fields and 50 fields (NTSC, PAL and SECAM)
Film transport	Power sprocket and capstan drive
Projection speed	Still and pause 18 or 24 frames/sec. with fine adjustment of -4 to +1 frames/sec. for super or single 8, and 15.5 to 21 frames/sec. variably adjusted for regular 8 (with the 18 button depressed) Variable 6 to 40 frames/sec. for super or single 8, and 7 to 48 frames/sec. for regular 8, continuously controllable
Tape-synchronize system	1 pulse/frame or 1 tone burst/frame
Sync pulse input	SYNC PULSE IN: minijack 2 V(p-p)
Automatic film stop	Automatic film stop possible by attaching sensing foil between perforations (not displayed in the picture) at desired spot on film.
Reel size	Up to 230 mm (9 inches) dia.
Film threading	Simple, straight forward, from supply reel through mechanism and sound system to take-up reel Automatic loop former system
Remote control	8-pin DIN receptacle
Power requirements	European model: 220 V ac, 50 Hz UK model: 240 V ac, 50 Hz U.S.A. and Canadian model: 120 V ac, 60 Hz Model for other countries: 120 or 220 V ac, 50/60 Hz
Power consumption	U.S.A. model: 75 W Other models: 95 W
Dimensions	Approx. 357 x 428 x 200 mm (w/h/d) (14 ¹ / ₁₆ x 16 ⁷ / ₈ x 7 ⁷ / ₈ inches) incl. projecting parts and controls
Weight	Approx. 13.57 kg (29 lb 15 oz)

Sound system

Film transport	Two pinch rollers and flywheels for each side of the sound head
Sound track	Magnetic
Picture/sound distance	18 frames
Audio output	AUDIO OUT: phone jack Level: -5 dB Monaural
Frequency response	50 Hz to 5 kHz \pm 2 dB (SMPTE ms8 mF Reference Film)
Total harmonic distortion	Less than 2.0 % at 400 Hz
Signal-to-noise ratio	Better than 40 dB (SMPTE Reference Film)
Wow and flutter	0.35% (WRMS) (except for use with the Remote Control Unit)

Video

Input	VIDEO IN: BNC connector 1 V \pm 50%, 75 ohms, unbalanced
Output	VIDEO OUT: BNC connector same as VIDEO IN

Optical

Lamp	12 V, 50 W halogen JC type lamp Parabolic mirror (adjustable) Glass diffuser
Lens mount	C-mount
Projection lens	f4, 50 mm, with lens cap, supplied Framing adjustment ring (for video cameras equipped with a ² / ₃ inch pickup tube), supplied

Accessories supplied

AC power cord (1)
Sprockets for regular 8 (2)
Film locking shoes for regular 8 (black) (2)
Connecting cord RK-118 (phone plug to miniplug (2 m) (1)
Plug Adaptor PC-5H or PC-5A (phone plug to minijack) (1)
75-ohm coaxial cable with BNC connectors (2 m) (1)
Frosted glass diffuser (1)
Dust cover (1)

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OPTIONAL ACCESSORIES

Color Video Camera DXC-1610 or DXC-1610P, DXC-1640
Camera Adaptor CMA-5 or CMA-5CE
Sensing Foil SF-2

TROUBLESHOOTING GUIDE

Should any problem occur with the unit, make the following simple checks to determine whether or not servicing is required. If the problem persists after you have made these checks, consult the nearest Sony dealer for further information.

The unit does not operate.

- The ac power cord is not plugged into a working outlet.
- The POWER switch is turned off.
- Improper setting of the FILM DRIVE CONTROL selector.

Unstable picture, or picture rolls.

- Video signal (or VD) is not connected to the unit.
- Pull-down movement of the claw requires adjustment. See page 10.
- Improper selection of film type.
- Improper setting of the VIDEO FIELD selector.
- The safety switch of the Tension Roller is activated. See page 10.
- Improperly threaded film at the film gate. See page 10.
- Dust or dirt on the light emitting surface of the LED. See page 13.

No sound from the monitor speaker, or sound is not heard clearly.

- The VOLUME control of the unit (and/or the volume control of the monitor) is turned down completely.
- The Sound Pad Stopper Release Lever is not pushed down for magnetic sound track(s).
- The film has an optical sound track.

Sound drop-outs, or excessive noise.

- Dirty audio playback head. See page 13.

The projected picture is not illuminated uniformly.

- The projection lamp and the parabolic mirror require adjustment of their positions. See page 11.

REMOTE CONTROL UNIT

RM-210

The Sony RM-210 Remote Control Unit is designed for operating the BM-2100 Telecinecorder from a remote location.

This remote control unit has the following features:

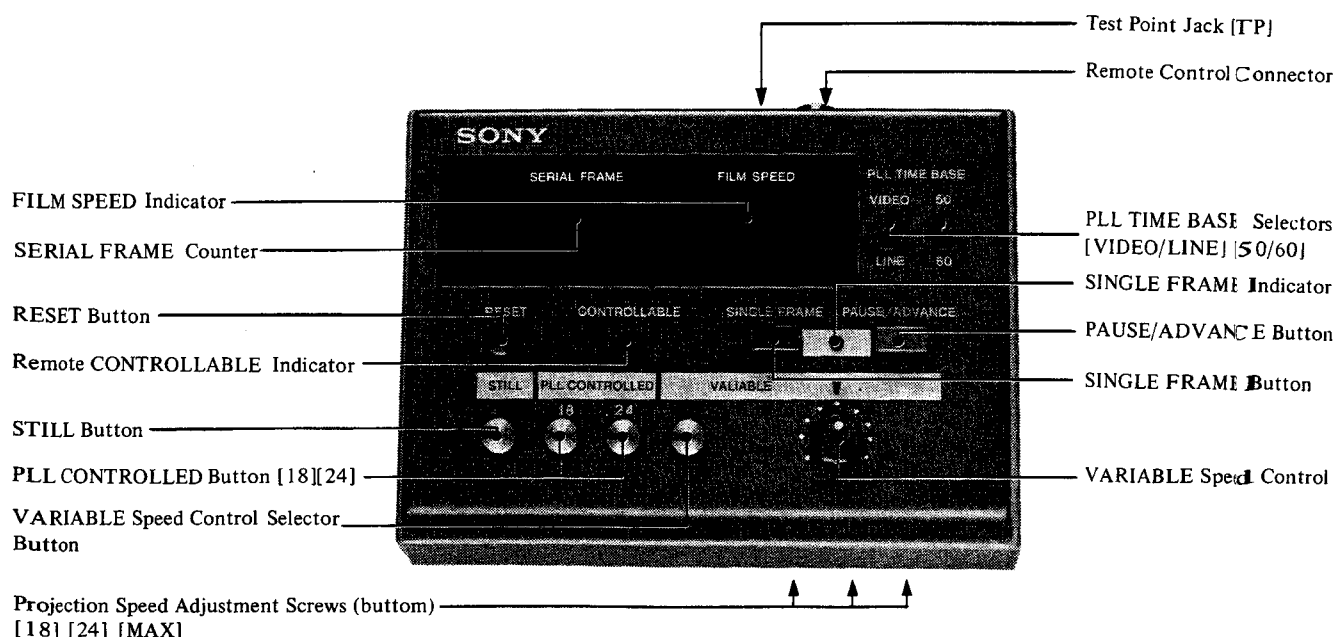
- Single frame advance.
- Pause function (frame stop).
- Still picture projection.
- Stable projection speed of 18 or 24 frames/sec. locked to the power line frequency or TV field.
- Variable speed control from 6 to 48 frames/sec. for super or single 8 and regular 8.
- Five-digit serial frame counter (automatically or manually reset to "00000").
- Three-digit projection speed indicator.

SPECIFICATIONS

Display	5-digit 7-segment LED serial frame counter 3-digit frame speed indicator (sampling every 0.5 sec.)
Film transport	Single frame advance Pause (frame stop) Still 18 or 24 frames/sec. (no fine adjustment when locked to power line frequency or TV field) Variable speed control, 6 to 48 frames/sec.
Dimensions	Approx. 186 x 68 x 140 mm (w/h/d) (7 ³ / ₈ x 2 ¹¹ / ₁₆ x 5 ⁹ / ₁₆ inches) incl. projecting parts and controls
Weight	Approx. 770 g (1 lb 11 oz)
Accessory supplied	Remote control cable RK-210 (5 m)

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LOCATION OF CONTROLS



OPERATION

Connect the remote control unit to the REMOTE control connector of the BM-2100 using the cable supplied with the remote control unit, and set the FILM DRIVE CONTROL selector of the BM-2100 to REMOTE. When the BM-2100 is turned on, the remote CONTROLLABLE indicator will light up, indicating that the BM-2100 can be operated by the remote control unit.

When the Function Lever of the BM-2100 is set to FWD, the SERIAL FRAME counter shows "00000" and starts counting frames. The projection speed is shown on the FILM SPEED indicator.

Projection at a constant speed of 18 or 24 frames/sec.

Select the time base with the PLL TIME BASE selectors. VIDEO: for projection locked to the video field. Select

50-field or 60-field system with the 50/60 selector.

LINE: for projection locked to the power line frequency.

Select 50 Hz or 60 Hz with the 50/60 selector.

Depress the 18 or 24 button. The film will be projected at a constant speed of 18 or 24 frames/sec.

Still picture projection

Depress the STILL button. A still picture will be displayed on the monitor. To release the button, depress the 18, 24 or VARIABLE speed control selector button. If the Function Lever of the BM-2100 is set to FWD with the STILL button depressed, the film will not run and still picture projection will result.

Pause

To stop the film momentarily, keep the PAUSE/ADVANCE button depressed. The film will stop while the button is being depressed. When the button is released, the film will run again.

Single-frame advance

Depress the SINGLE FRAME button. The SINGLE FRAME indicator will light up, and a still picture will be displayed on the monitor. Depress the PAUSE/ADVANCE button. The film advances by one frame each time the button is depressed. To release the SINGLE FRAME button, depress it again.

Note: Do not depress the SINGLE FRAME button before the Function Lever of the BM-2100 is set to FWD. Otherwise the film will run and a still picture will not be obtained.

Variable speed control

Depress the VARIABLE speed control selector button, and adjust the speed with the VARIABLE speed control. Projection speed is indicated on the FILM SPEED indicator. The speed can be adjusted from 6 to 48 frames/sec. for super or single 8 and regular 8.

SERIAL FRAME counter and RESET button

The SERIAL FRAME counter starts counting the number of frames in five digits from "00000" whenever the Function Lever of the BM-2100 is set to FWD. When the Function Lever is set to STOP, the counter is reset to "00000" automatically though the counter indication disappears. When the STILL button is depressed, the counter stops counting and reads the number of frames that has been counted.

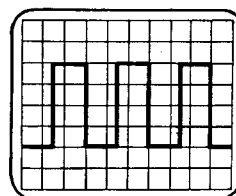
To set the counter to "00000", depress the RESET button.

Adjusting the precision of the projection speed

The projection speed is controlled by means of the VARIABLE speed control with the VARIABLE speed control selector button depressed. The maximum speed can be adjusted by the MAX control on the bottom. Insert a small screwdriver into the MAX control, and turn the screw clockwise or counterclockwise so that the FILM SPEED indicator shows approximately 48 frames/sec.

The 18 and 24 buttons assure stable projection at constant speeds of 18 and 24 frames/sec. These speeds have been preadjusted at the factory. However, should more precise adjustment be required after extended and repeated operations, the speeds can be adjusted by means of the 18 and 24 controls on the bottom and using an oscilloscope. Adjustment procedures are as follows:

Connect an oscilloscope to the TP jack (minijack). Respectively depress the 18 and 24 buttons, and adjust the 18 and 24 controls with a small screwdriver observing the waveform displayed on the oscilloscope. Turn the screws clockwise or counterclockwise so that the upper and lower horizontal lines of the square wave are equal to each other. This is the best point where the projection speed is most stable.



BEAM SPLITTER

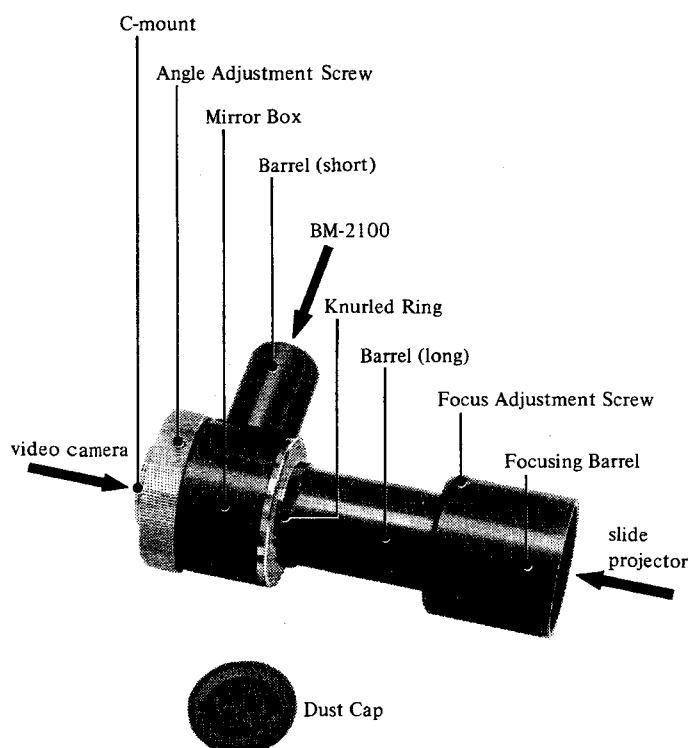
VCR-210

The VCR-210 has been designed especially for use with the Sony Color Video Cameras. It adapts the Sony BM-2100 Telecinecorder and a slide projector for use with these cameras. With the use of the VCR-210, 8mm films and slides may be viewed on single- or multiple-monitor systems and transferred to video tapes if desired.

PRECAUTIONS

- Avoid rough handling. The VCR-210 is a precision optical device.
- Clean the VCR-210 carefully. Blow off dust with a dust blower or a fine soft brush.
- Keep the VCR-210 away from excessive dust and moisture. When not in use, keep the dust cap in place.
- Do not try disassemble and repair the VCR-210. Refer servicing to your nearest Sony dealer.

LOCATION OF PARTS



INSTALLATION ONTO THE VIDEO CAMERA

The use of the Sony DXC-1600 series Color Video Camera is recommended. The lens mount of these cameras is a standard C-mount.

- 1 Remove the lens from the camera.
- 2 Screw the VCR-210 into the lens mount of the camera.
- 3 When a slide projector is to be used, attach a 100 - 105 mm f5.6 - 8 enlarging lens having a Leica screw thread (M39mm, P x 1mm) to the Focusing Barrel. Normally lens opening of f16 may be enough.
- 4 Open the casing of the slide projector, and remove the condenser lens. Attach the opal glass diffuser (supplied) instead. If the diffuser does not fit, trim it to the appropriate size.
- 5 Remove the projection lens from the slide projector.

Notes

- When a slide projector is not in use, unscrew the long barrel with the Focusing Barrel by turning the knurled ring, and keep the dust cap in place.
- If the short barrel is not directed straight towards the projection lens of the BM-2100 Telecinecorder, loosen the Angle Adjustment Screw, and turn the Mirror Box so that the barrel is directed straight towards the projection lens and the optical axis of the barrel coincides with that of the lens.
- For focusing of the slide projector, loosen the Focus Adjustment Screw, and adjust focus by moving the Focusing Barrel. After focus adjustment, tighten the screw.

SPECIFICATIONS

Lens mount	Standard C-mount
Optical components	Beam splitter prism
Dimensions	
Weight	Approx. 310 g (11 oz)
Accessories supplied	Opal glass diffuser (for slide projector) Dust cap

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MOUNTING PLATE

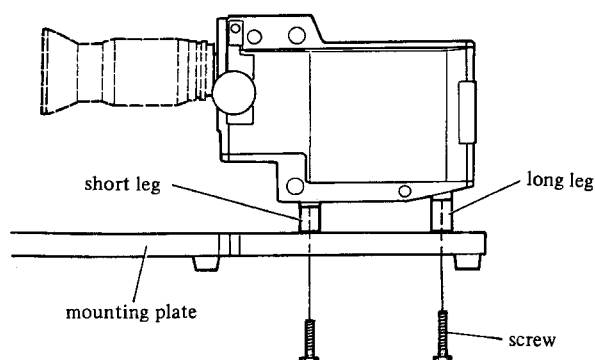
MVS-210

The MVS-210 is a mounting plate designed for installing the Sony BM-2100 Telecinecorder and the Sony DXC-1600 series Color Video Camera on it.

INSTALLATIONS

Installation of the video camera

- ① Unscrew and remove the carrying handle of the camera with a wrench.
- ② Loosen the knurled locking screw and remove the handgrip.
- ③ Mount the camera onto the mounting plate upside down using the camera legs and screws (supplied) as illustrated.



- ④ Remove the lens from the camera and attach the VCR-210 Beam Splitter. For details, refer to the VCR-210 instruction manual.

Installation of the BM-2100

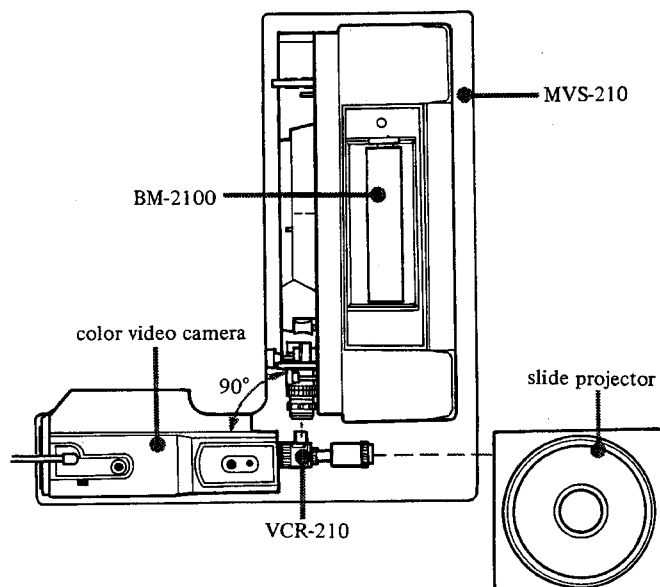
Place the BM-2100 Telecinecorder on the mounting plate at right angles with the camera so that the projection lens of the BM-2100 is directed straight towards the short barrel of the VCR-210, and the optical axis of the projection lens coincides with that of the short barrel. If the short barrel of the VCR-210 is not directed straight towards the projection lens of the BM-2100, the position of the short barrel can be adjusted by loosening the Angle Adjustment Screw of the VCR-210 and turning the Mirror Box.

Installation of a slide projector

Place a slide projector with the opal glass diffuser (supplied with the VCR-210) attached instead of the condenser lens, so that the camera and the slide projector face each other with the opal glass diffuser directed

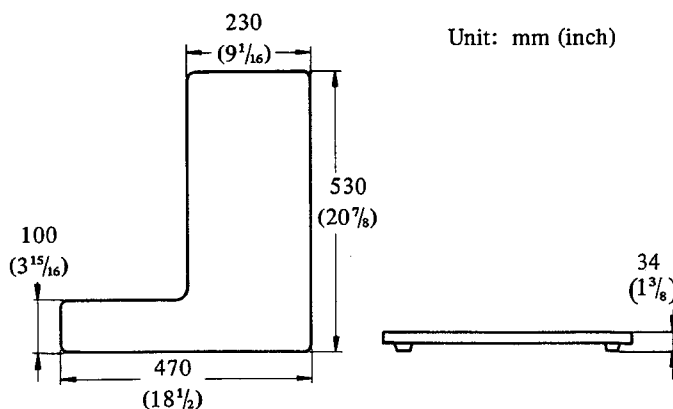
straight towards the Focusing Barrel of the VCR-210 and the optical axis of the opal glass diffuser coinciding with that of the Focusing Barrel.

Note: The slide projector is not mounted on the mounting plate. See the illustration.



SPECIFICATIONS

Dimensions



Weight

Approx. 2.22 kg (4 lb 14 oz)

Accessories supplied

Camera legs (2)
Screws (2)

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